Neal Mitchell Associates

1041 Sutton Street, Northbridge, MA 01534

Tel: 508-234-8646 Fax: 508-234-8759 e-mail: nmitchell2@aol.com

Mr. Joseph Laydon
Town Planner
Grafton Memorial Municipal Center
30 Providence Road
Grafton, MA 01519

RE: Meadow Lane Retaining Wall Replacement

Dear Mr. Laydon:

The proposed replacement wall has been designed, and then based on this design the plans were prepared by **Land Planning, Inc.** The plans are stamped by Norman G. Hill PE (Civil #31887). The basic design and my analysis of that design is based on gravity wall considerations. However, this wall uses a proprietary block (ReCon) and a design which considers the wall as a segmented gravity wall.

The components that are used in this segmented wall are sold by ReCon, and the concrete blocks that were used in this design were of varying lengths that are interconnected by keyways to form a battered gravity wall. The manufacturers of this block have developed a propriety analysis program that is based on the NMCA and AASHTO considerations for wall of this type. I used this ReCon software program to check this design.

The design, as drawn, complies with the manufacturers recommended block sizes based on wall height. Therefore, these walls are compliant with the manufacturer's criteria, so they represent the standard practice for the design of segmented gravity walls. **This letter certifies that these walls are properly designed and drawn.**

In the job notes on the plans there is a section titled "Reinforced Backfill Placement" that references the use of geogrids. Geogrids are not used in this design, but the procedures for soil compaction procedures and tests is applicable to this design so this section does not need to be altered.

This design calls for a 6" cocoon of concrete to be placed around the reinforced concrete pipe. The cocoon is being used as a pad between the ReCon blocks and the pipe. I suggest the use of #4 reinforcing rods (Each-Way @ 6" oc on all three sides of the cocoon), as reinforcement in this concrete cocoon. This suggestion is based on the fact that the existing pipe has been crushed so I believe that this additional reinforcement makes good sense. This change only requires a note on the present plans.

Please call me if you have any questions.

Sincerely,

Neal B. Mitchell, Jr. PE SE
MA #18222

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JUL 24 2017

PLANNING BOARD
GRAFTON, MA

GRAVES ENGINEERING, Inc.
100 GROVE ST. | WORCESTER, MA 01605
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gravesengineering.com

July 24, 2017

Joseph Laydon
Town Planner
Grafton Municipal Center
30 Providence Road
Grafton, MA 01519

Subject: Fieldstone Farms (aka Meadow Lane)
Retaining Wall Replacement Plan Review

Dear Joe:

We received the following documents on July 24, 2017 via e-mail:

- Plans entitled Retaining Wall Replacement Located at Meadow Lane, Grafton, MA dated April 10, 2017 and last revised July 24, 2017, prepared by Land Planning, Inc. for Magill Associates, Inc. (2 sheets)

Graves Engineering, Inc. (GEI) has been requested to review and comment on the plans' consistency with the definitive plans dated February 1, 1994 and last revised November 21, 1994, consistency with the retaining wall replacement goals set in 2012, and standard engineering practices. As part of our initial review, GEI visited the site on June 2, 2017.

This letter is a follow-up to our previous review letters dated June 5, 2017 and July 20, 2017. For clarity, comments from our previous letters are *italicized* and our latest comments to the design engineer's responses are depicted in **bold**. For brevity, comments previously addressed by the design engineer and acknowledged by GEI have been omitted. Previous comment numbering has been maintained.

Our comments follow:

1. *The "Culvert Through Wall Section" on Sheet 2 of the plans proposes only six inches of concrete around the culvert pipe and mislabeled the culvert pipe as "RCP" instead of "HDPE." We are concerned about the load being placed onto the HDPE culvert. A reinforced concrete lintel of sufficient strength needs to be designed to span each of the three culvert penetrations, and the mislabeling of the pipe material needs to be corrected.*

   July 20, 2017:
   The design engineer responded that reinforced concrete pipe is to replace the high-density polyethylene pipe at the walls. This approach is reasonable. However, the "Culvert Through Wall Section" construction detail proposes that the two pipe materials are to be butted together with only a "doublewide Mar Mac polyseal repair coupler" to seal (cover) the joint between the two pipe materials. Due to the different pipe materials (rigid concrete and flexible HDPE), one pipe could be displaced from the other due to shear forces. Our research found that in addition to the Mar Mac seal, the pipes need to be protected from movement by using an HDPE "internal coupler spigot adapter" (not recommended for use when the HDPE pipe is downstream from the RCP), a similar bell/spigot-type connection, a coupling connection, or a concrete collar.

Acknowledged. The "Culvert Through Wall Section" construction detail was revised to specify a "Fernco Large Diameter Series coupling" at the two pipe joints.

2. *Information available from the wall block manufacturer indicates that guard rail posts are to be set in a grout-filled Sonotube with a minimum embedment of five feet. The plans propose direct-burial posts embedded only 41" into the ground. The plans need to be revised to meet or exceed the manufacturer's recommendations.*

   July 20, 2017:
   The plans were revised to include a Sonotube whose bottom is five feet below grade with a post length of only 41". The Sonotube offers little, if any, structural strength. Whereas the post is located near the retaining wall and protecting the wall's integrity is important, we understand that the post needs to be embedded five feet (per the wall manufacturer) even if this length exceeds the guard rail manufacturer's recommendation. The detail needs to be revised to provide a post embedment depth of at least five feet and to specify grout between the post and the Sonotube.
   Acknowledged. The "Guard Rail Placement Detail" was revised to show the post embedded five feet.

4. *On Sheet 1, the individual blocks weren't labeled on the two retaining wall elevations. Standard practice for wall systems such as the one proposed is to label the block type (e.g. 60B, 60M, 45M, 24T) of each block to avoid confusion during construction. For example, there are sections of the walls that require nine courses adjacent to sections that require ten courses, each of which requires different base blocks.*

   July 20, 2017:
   The blocks were labeled as requested. On the right side of the "North Retaining Wall Elevation" there are two base blocks labeled as 60M that need to be revised to 60B.
   Acknowledged. The remaining two labels on Sheet 1 were revised.

7. *The retaining wall is available in various textures. The plans do not propose a texture; we recommend that the design engineer coordinate a texture with the Planning Board.*
   GEI has no issue with the proposed North Shore Granite texture; we defer final consideration of the texture to the Planning Board.

8. *GEI did not perform a structural engineering peer review of the proposed replacement wall. Such a review is beyond the scope of this general civil engineering peer review.*
   No further comment necessary.

We trust this letter addresses your review requirements. Feel free to contact this office if you have any questions or comments.

Very truly yours,
Graves Engineering, Inc.

Jeffrey M. Walsh, P.E.
Vice President

cc: Norman Hill, P.E., P.L.S.; Land Planning, Inc.
Maria Mast, Grafton Conservation Department
Bob Berger, Grafton Building Department
Brian Szczurko, Grafton Engineering Dept.
Dave Crouse, Grafton DPW
Paul Cournoyer, Grafton Sewer Department

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Received 7/24/17 @ 7:05pm

Textures

ReCon currently offers its licensed manufacturers a choice of four types of face textures. Most producers choose one of these textures as their standard and elect to maintain a working inventory of that texture. Other textures may still be available as a special order. As with most special orders, additional costs may be involved and sufficient time should be allowed for setup and production. Check with the ReCon licensed manufacturer in your market to determine what textures are available.

1) Le Sueur County Limestone

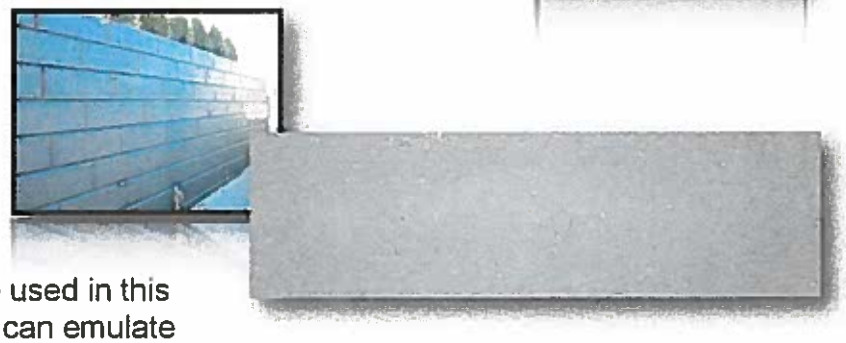
This texture offers the look of a broken and weathered limestone. This texture lends itself well to accent staining. When certain stain colors are used, Le Sueur County Limestone can also take on the appearance of a weathered sandstone material.

2) North Shore Granite

Granite may be the most universally recognized natural stone on earth. While its coloration varies widely, the texture of an unprocessed granite is somewhat consistent in the way it fractures due to its composition and density. Stained or unstained, the appearance of North Shore Granite can be nearly indistinguishable from weathered natural stone.

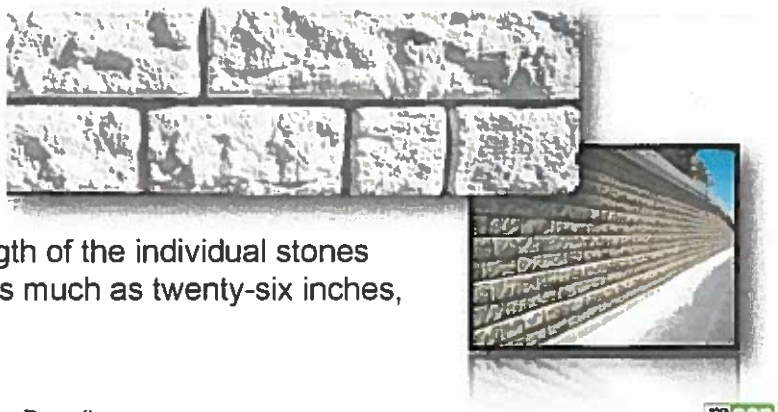
3) Old World

ReCon's Old World texture was originally developed as a "special order" to match the appearance of the popular cut stone building materials used in the late 1800's and early 1900's. Many different types of stone were used in this manner and the Old World texture can emulate most of them depending on the stains that are used. The face also lends itself to further processing, such as sandblasting or using a retarder to expose aggregates.



4) Rustic

The Rustic Stone texture captures the authenticity of a natural weathered cut stone that has been stacked in eight-inch coursing. The length of the individual stones varies from as little as eight inches to as much as twenty-six inches, resulting in a natural random pattern.



recon

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July 24, 2017

Joseph Laydon
Town Planner
Grafton Municipal Center
30 Providence Road
Grafton, MA 01519

Subject: Fieldstone Farms (aka Meadow Lane)
Retaining Wall Replacement Plan Review

Dear Joe:

We received the following documents on July 24, 2017 via e-mail:

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This letter is a follow-up to our previous review letters dated June 5, 2017 and July 20, 2017. For clarity, comments from our previous letters are *italicized* and our latest comments to the design engineer's responses are depicted in **bold**. For brevity, comments previously addressed by the design engineer and acknowledged by GEI have been omitted. Previous comment numbering has been maintained.

Our comments follow:

1. *The "Culvert Through Wall Section" on Sheet 2 of the plans proposes only six inches of concrete around the culvert pipe and mislabeled the culvert pipe as "RCP" instead of "HDPE." We are concerned about the load being placed onto the HDPE culvert. A reinforced concrete lintel of sufficient strength needs to be designed to span each of the three culvert penetrations, and the mislabeling of the pipe material needs to be corrected.*

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   July 20, 2017:
   The blocks were labeled as requested. On the right side of the "North Retaining Wall Elevation" there are two base blocks labeled as 60M that need to be revised to 60B.
   Acknowledged. The remaining two labels on Sheet 1 were revised.

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   No further comment necessary.

We trust this letter addresses your review requirements. Feel free to contact this office if you have any questions or comments.

Very truly yours,
Graves Engineering, Inc.

Jeffrey M. Walsh, P.E.
Vice President

cc: Norman Hill, P.E., P.L.S.; Land Planning, Inc.
Maria Mast, Grafton Conservation Department
Bob Berger, Grafton Building Department
Brian Szczurko, Grafton Engineering Dept.
Dave Crouse, Grafton DPW
Paul Cournoyer, Grafton Sewer Department

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JUL 20 2017

PLANNING BOARD
GRAFTON, MA

GRAVES ENGINEERING, Inc.
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gravesengineering.com

July 20, 2017

Joseph Laydon
Town Planner
Grafton Municipal Center
30 Providence Road
Grafton, MA 01519

Subject: Fieldstone Farms (aka Meadow Lane)
Retaining Wall Replacement Plan Review

Dear Joe:

We received the following documents on July 18, 2017 via e-mail:

- Correspondence from Land Planning, Inc. to Grafton Planning Board dated July 18, 2017.
- Plans entitled Retaining Wall Replacement Located at Meadow Lane, Grafton, MA dated April 10, 2017 and revised July 17, 2017, prepared by Land Planning, Inc. for Magill Associates, Inc. (2 sheets)

Graves Engineering, Inc. (GEI) has been requested to review and comment on the plans' consistency with the definitive plans dated February 1, 1994 and last revised November 21, 1994, consistency with the retaining wall replacement goals set in 2012, and standard engineering practices. As part of our initial review, GEI visited the site on June 2, 2017.

This letter is a follow-up to our previous review letter dated June 5, 2017. For clarity, comments from our previous letter are *italicized* and our comments to the design engineer's responses are depicted in **bold**. Previous comment numbering has been maintained.

Our comments follow:

1. *The plans do not show the existing stone/boulder wingwalls located at the ends of the existing gabion retaining walls. The plans need to clarify how the proposed retaining walls will tie into the existing wing walls.*
   Acknowledged. Sheet 1 was revised to show the existing boulder wingwalls and a set of construction notes was added to guide the contractor relative to construction at the wingwall/retaining wall interface.

2. *The "Culvert Through Wall Section" on Sheet 2 of the plans proposes only six inches of concrete around the culvert pipe and mislabeled the culvert pipe as "RCP" instead of "HDPE." We are concerned about the load being placed onto the HDPE culvert. A reinforced concrete lintel of sufficient strength needs to be designed to span each of the three culvert penetrations, and the mislabeling of the pipe material needs to be corrected.*
   The design engineer responded that reinforced concrete pipe is to replace the high-density polyethylene pipe at the walls. This approach is reasonable. However, the "Culvert Through Wall Section" construction detail proposes that the two pipe materials are to be butted together with only a "doublewide Mar Mac polyseal repair coupler" to seal (cover) the joint between the two pipe materials. Due to the

different pipe materials (rigid concrete and flexible HDPE), one pipe could be displaced from the other due to shear forces. Our research found that in addition to the Mar Mac seal, the pipes need to be protected from movement by using an HDPE "internal coupler spigot adapter" (not recommended for use when the HDPE pipe is downstream from the RCP), a similar bell/spigot-type connection, a coupling connection, or a concrete collar.

3. *Information available from the wall block manufacturer indicates that guard rail posts are to be set in a grout-filled Sonotube with a minimum embedment of five feet. The plans propose direct-burial posts embedded only 41" into the ground. The plans need to be revised to meet or exceed the manufacturer's recommendations.*
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4. *The wall section construction details on Sheet 2 show the base blocks having grooves in their bottom (these are middle blocks) instead of having a flat bottom (base blocks). The construction details must be revised to show base blocks.*
   Acknowledged. The construction details were revised to show base blocks at the bottom of the walls.

5. *On Sheet 1, the individual blocks weren't labeled on the two retaining wall elevations. Standard practice for wall systems such as the one proposed is to label the block type (e.g. 60B, 60M, 45M, 24T) of each block to avoid confusion during construction. For example, there are sections of the walls that require nine courses adjacent to sections that require ten courses, each of which requires different base blocks.*
   The blocks were labeled as requested. On the right side of the "North Retaining Wall Elevation" there are two base blocks labeled as 60M that need to be revised to 60B.

6. *On Sheet 2, Note II.B, II.G and E.1 refer to geogrid. However, geogrid is not proposed elsewhere on the plans; the design is for a gravity wall instead. The references to geogrid are confusing and should be deleted.*
   Acknowledged. The notes referencing geogrid were deleted.

7. *The retaining wall is available in various textures. The plans do not propose a texture; we recommend that the design engineer coordinate a texture with the Planning Board.*
   GEI has no issue with the proposed North Shore Granite texture; we defer final consideration of the texture to the Planning Board.

8. *GEI did not perform a structural engineering peer review of the proposed replacement wall. Such a review is beyond the scope of this general civil engineering peer review.*
   No further comment necessary.

We trust this letter addresses your review requirements. Feel free to contact this office if you have any questions or comments.

Very truly yours,
Graves Engineering, Inc.

Jeffrey M. Walsh, P.E.
Vice President

cc: Norman Hill, P.E., P.L.S.; Land Planning, Inc.
Maria Mast, Grafton Conservation Department
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Dave Crouse, Grafton DPW
Paul Cournoyer, Grafton Sewer Department

Mayer, Antonellis, Jachowicz & Haranas, LLP

Attorneys at Law

288 Main Street, Milford, MA 01757
Tel. (508) 473-2203 Telecopier (508) 473-4041

William H. Mayer
Robert P. Jachowicz
Joseph M. Antonellis
Peter J. Haranas
Jill P. Dawiczyk
Erin Wright (also admitted in R.I.)

May 10, 2017

Joseph Laydon
Town Planner
Town of Grafton
Grafton Municipal Center
30 Providence Road
Grafton, MA 01519

RE: **Meadow Lane, Repair of Retaining Wall**

Dear Mr. Laydon:

As you know, Magill Associates, Inc. ("MAI") is in the process of repairing the retaining wall at the Meadow Lane subdivision.

The procedures by which the work will be undertaken have been approved by the Conservation Commission. The plans showing the design of the retaining wall have been submitted to the Building Inspector.

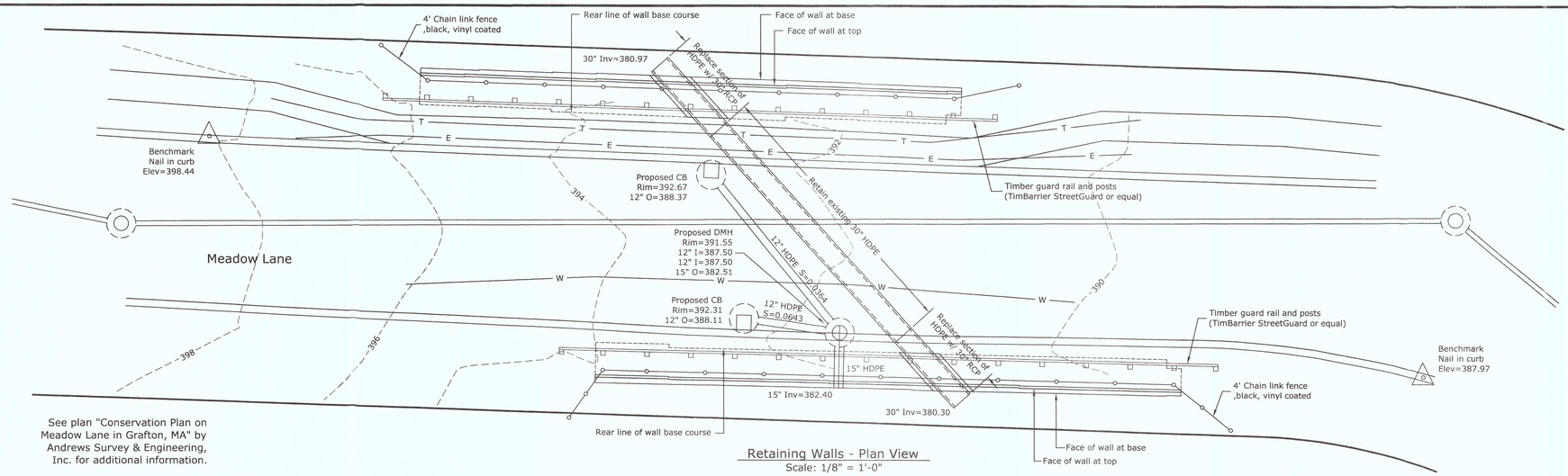
As the roadways and related infrastructure were approved by the Planning Board, I believe it may be prudent to schedule a public hearing so that the Board (and its peer review consultant) can review the plans as the anticipated work is a repair of a previously approved wall design.

Please place the matter on the agenda for the Planning Board hearing scheduled for **June 12, 2017**.

Very truly yours,

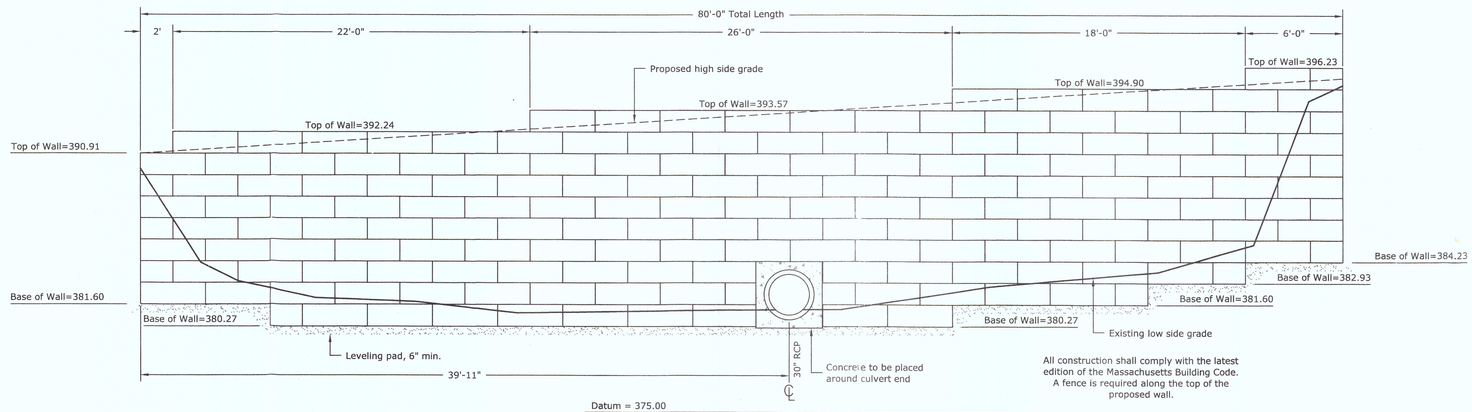
Joseph M. Antonellis

JMA/jrf

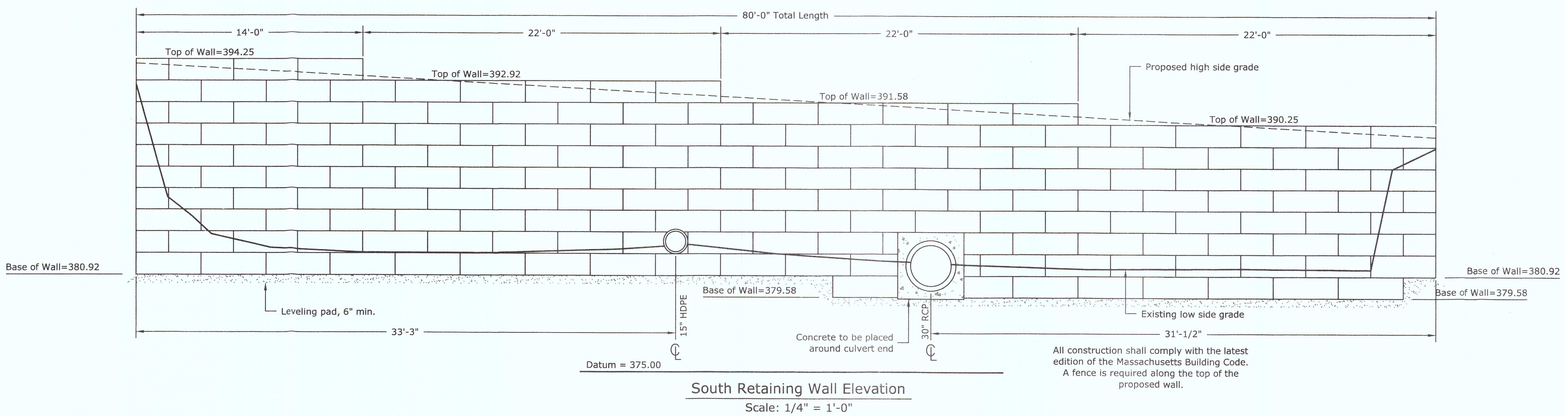


See plan "Conservation Plan on Meadow Lane in Grafton, MA" by Andrews Survey & Engineering, Inc. for additional information.

Retaining Walls - Plan View
Scale: 1/8" = 1'-0"



North Retaining Wall Elevation
Scale: 1/4" = 1'-0"



South Retaining Wall Elevation
Scale: 1/4" = 1'-0"

RECEIVED
MAY - 5 2017
INSPECTOR OF BUILDINGS
TOWN OF GRAFTON

Retaining Wall Replacement

Plan & Elevations

Located at
Meadow Lane
Grafton, MA

Prepared For
Magill Associates, Inc.
21 Central Square
P.O. Box 565
Grafton, MA 01519

April 10, 2017
Scale: As Noted

LEGEND

O	IRON PIN FOUND
◉	DRILL HOLE FOUND
□	BOUND FOUND
D	DRAIN MANHOLE
S	SEWER MANHOLE
UP	UTILITY POLE
FH	HYDRANT
GV	GATE VALVE
CS	CURB STOP
500	EXISTING CONTOUR
	PROPOSED CONTOUR
500.0x	PROPOSED SPOT GRADE
☼	LIGHT FIXTURE - POLE MOUNT
◀	LIGHT FIXTURE - WALL MOUNT
	SIGN
W	WATER LINE
G	GAS
S	SEWER SERVICE

COMMONWEALTH OF MASSACHUSETTS
NORMAN G. HILL
CIVIL
No. 31887
REGISTERED PROFESSIONAL ENGINEER

Date: 4-14-17
Norman G. Hill, PE #31887

REVISIONS

No.	Date	Design	Checked
1			
2			
3			
4			
5			
6			

Field By:		
Designed By:	MHG	4/17
Drawn By:	MHG	4/17
Checked By:	NGH	4/17

Land Planning, Inc.
Civil Engineers • Land Surveyors
Environmental Consultants

Bellingham
167 Hartford Ave.
Bellingham, MA 02019
508-966-4130

North Grafton
214 Worcester St.
N. Grafton, MA 01536
508-839-9526

Hanson
1115 Main Street
Hanson, MA 02341
781-294-4144

www.landplanninginc.com

Date	Sheet No.
April 10, 2017	1
Job No. G8953	

I. CONCRETE

A. All concrete will be mixed to achieve a minimum 3,000 psi compressive strength in 28 days. In areas of freeze/thaw cycles, adequate protection by air-entrainment must be provided.

II. GENERAL

A. Work shall consist of construction of a Retaining Wall System in accordance with these specifications and in reasonably close conformity with the lines, grades, design, and dimensions as shown.

B. Work includes furnishing and installing geogrid soil reinforcement of the type, size, location, and lengths designated.

C. Base Leveling Pad Material shall consist of a compacted crushed stone base or non-reinforced concrete as shown.

D. Unit Drainage Fill shall consist of clean 1" minus crushed stone or crushed gravel meeting the following gradation tested in accordance with ASTM D-422:

Sieve Size	Percent Passing
1 inch	100
3/4 inch	75-100
No. 4	0-10
No. 50	0-5

E. One cubic foot, minimum, of drainage fill shall be used for each square foot of wall face. Drainage fill shall be placed between and behind units to meet this requirement.

F. Reinforced Backfill shall be free of debris and stones larger than 2". Backfill soil shall be classified as UNCS SW, SP, or SM.
1. The maximum aggregate size shall be limited to 3/4 inch unless field tests have been performed to evaluate potential strength reductions to the geogrid design due to damage during construction.
2. Material can be site excavated soils where the above requirements can be met. Unsuitable soils for backfill (high plastic clays, organic soils, soils with >12% fines) shall not be used in the backfill or in the reinforced soil mass.
3. Contractor shall submit reinforced fill sample and laboratory test results to the Engineer for approval prior to the use of any proposed reinforced fill material.

G. Geogrid Soil Reinforcement shall consist of high tenacity geogrids or geotextiles manufactured specifically for soil reinforcement applications. The type, strength and location shall be as shown.

H. Drainage collection pipe shall be a perforated or slotted corrugated HDPE pipe. The pipe and drainage aggregate shall be wrapped with a geotextile fabric that will function as a filter.

I. All buried utilities as shown are taken from available information and are to be considered as approximate only. Prior to commencement of construction, the contractor is to contact DIG SAFE at 1-888-DIG SAFE to have all buried utilities properly located.

III. EXECUTION

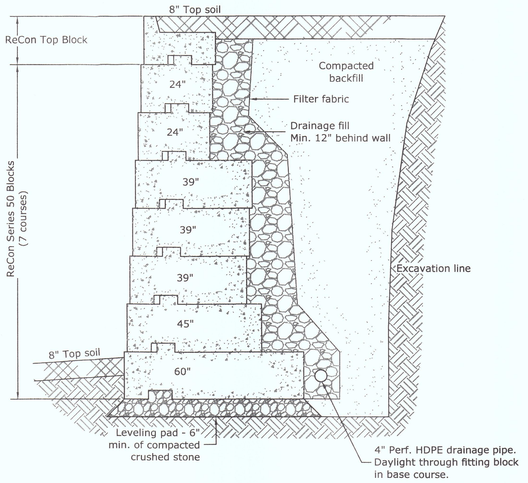
A. Excavation
1. Contractor shall excavate to the lines and grades as shown. The Engineer shall inspect the excavation and approve prior to placement of leveling material or fill soils.
2. Following excavation for the leveling pad and/or reinforced soil zone, the soil shall be examined by the Engineer to assure the actual foundation soil strength meets or exceeds the assumed designed bearing strength. Soils not meeting the required strength shall be removed and replaced with soil meeting the design criteria, as directed by the Engineer.

B. Base Leveling Pad
1. Leveling pad material shall be placed to the lines and grades shown, to a minimum thickness of 6 inches and extend laterally a minimum of 6" in front and behind the concrete wall unit.
2. Soil leveling pad materials shall be compacted to a minimum of 95% of the maximum standard Proctor density per ASTM D-698.
3. Leveling pad shall be prepared to insure full contact to the base surface of the concrete units.

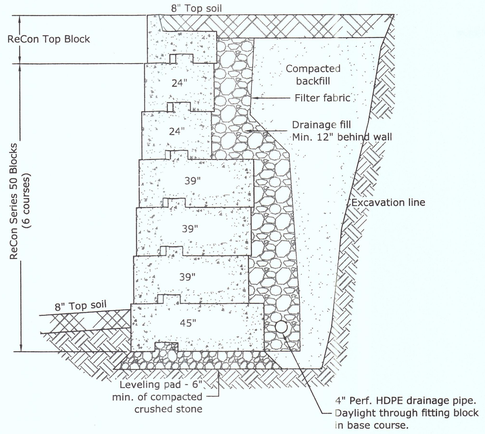
C. Modular Unit Installation
1. First course of units shall be placed on the leveling pad at the appropriate line and grade. Alignment and level shall be checked in all directions and insure that all units are in full contact with the base and properly seated.
2. Place the front of units side-by-side. Do not leave gaps between adjacent units. Layout of corners and curves shall be in accordance with manufacturer's recommendations.
3. Place and compact drainage fill within and behind wall units. Place and compact backfill soil behind drainage fill. Follow wall erection and drainage fill closely with structure backfill.
4. Maximum stacked vertical height of wall units, prior to unit drainage fill and backfill placement and compaction, shall not exceed one course.

E. Reinforced Backfill Placement
1. Reinforced backfill shall be placed, spread, and compacted in such a manner that minimizes the development of slack in the geogrid and installation damage.
2. Reinforced backfill shall be placed and compacted in lifts not to exceed 6 inches where hand compaction is used, or 8-10 inches where heavy compaction equipment is used. Lift thickness shall be decreased to achieve the required density as required.
3. Reinforced backfill shall be compacted to 95% of the maximum density as determined by ASTM D698. The moisture content of the backfill material prior to and during compaction shall be uniformly distributed throughout each layer and shall be dry of optimum, + 0%, - 3%.
4. Only lightweight hand-operated equipment shall be allowed within 3 feet from the soil side of the modular concrete unit.
5. Tracked construction equipment shall not be operated directly upon the geogrid reinforcement. A minimum fill thickness of 6 inches is required prior to operation of tracked vehicles over the geogrid. Tracked vehicle turning should be kept to a minimum to prevent tracks from displacing the fill and damaging the geogrid.
6. Rubber tired equipment may pass over geogrid reinforcement at slow speeds, less than 10 MPH. Sudden braking and sharp turning shall be avoided.
7. At the end of each day's operation, the Contractor shall slope the last lift of reinforced backfill away from the wall units to direct runoff away from wall face. The Contractor shall not allow surface runoff from adjacent areas to enter the wall construction site.

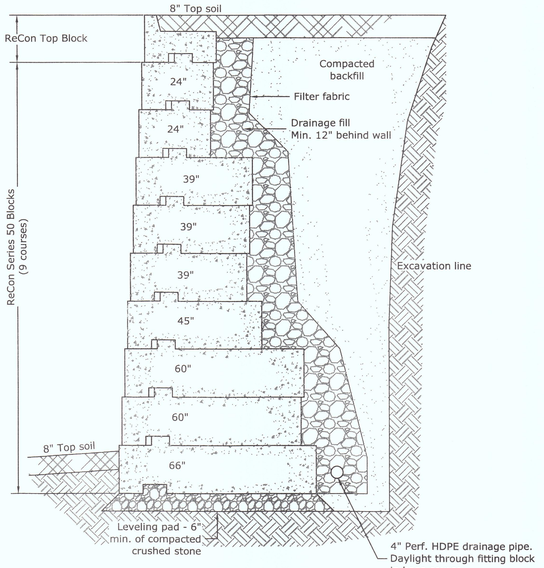
F. Field Quality Control
1. The Owner shall engage inspection and testing services, including independent laboratories, to provide quality assurance and testing services during construction. This does not relieve the Contractor from securing the necessary construction control testing during construction.
2. Testing and inspections services shall only be performed by qualified and experienced technicians and engineers.
3. As a minimum, quality assurance testing should include foundation soil inspection, soil and backfill testing, verification of design parameters, and observation of construction for general compliance with design drawings and specifications.



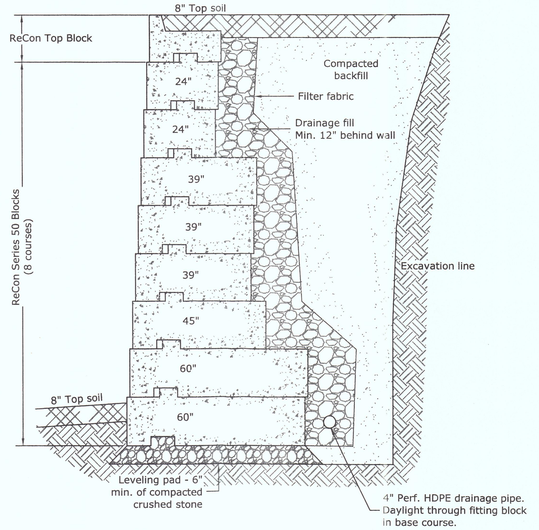
8 Course Wall Section
Scale: 1/2" = 1'-0"



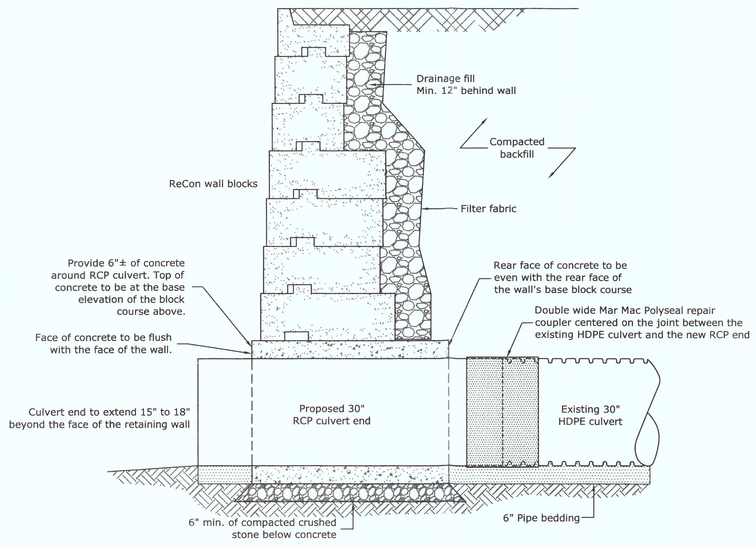
7 Course Wall Section
Scale: 1/2" = 1'-0"



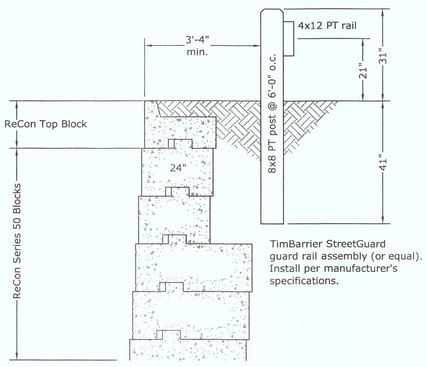
10 Course Wall Section
Scale: 1/2" = 1'-0"



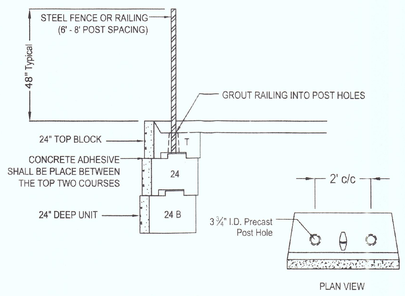
9 Course Wall Section
Scale: 1/2" = 1'-0"



Culvert Through Wall Section
Scale: 1/2" = 1'-0"



Guard Rail Placement Detail
Scale: 1/2" = 1'-0"



FENCE SECTON DETAIL
PRECAST FENCE POST HOLES

Retaining Wall Replacement

Details & Sections

Located at
Meadow Lane
Grafton, MA

Prepared For
Magill Associates, Inc.
21 Central Square
P.O. Box 565
Grafton, MA 01519

April 10, 2017
Scale: As Noted

COMMONWEALTH OF MASSACHUSETTS
NORMAN G. HILL
CIVIL
No. 31887
REGISTERED PROFESSIONAL ENGINEER

Date: 4-14-17

Norman G. Hill, PE #31887

REVISIONS

No.	Date	Design	Checked
1			
2			
3			
4			
5			
6			
Field By:			
Designed By:		MHG	4/17
Drawn By:		MHG	4/17
Checked By:		NGH	4/17

Land Planning, Inc.
Civil Engineers • Land Surveyors
Environmental Consultants

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167 Hartford Ave.
Bellingham, MA 02019
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North Grafton
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508-839-9526

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Date	Sheet No.
April 10, 2017	2
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June 5, 2017

Joseph Laydon
Town Planner
Grafton Municipal Center
30 Providence Road
Grafton, MA 01519

Subject: Fieldstone Farms (aka Meadow Lane)
Retaining Wall Replacement Plan Review

Dear Joe:

We received the following document on May 10, 2017:

- Plans entitled Retaining Wall Replacement Located at Meadow Lane, Grafton, MA dated April 10, 2017, prepared by Land Planning, Inc. for Magill Associates, Inc. (2 sheets)

Graves Engineering, Inc. (GEI) has been requested to review and comment on the plans' consistency with the definitive plans dated February 1, 1994 and last revised November 21, 1994, consistency with the retaining wall replacement goals set in 2012, and standard engineering practices. As part of this review, GEI visited the site on June 2, 2017.

Our comments follow:

1. The plans do not show the existing stone/boulder wingwalls located at the ends of the existing gabion retaining walls. The plans need to clarify how the proposed retaining walls will tie into the existing wing walls.

2. The "Culvert Through Wall Section" on Sheet 2 of the plans proposes only six inches of concrete around the culvert pipe and mislabeled the culvert pipe as "RCP" instead of "HDPE." We are concerned about the load being placed onto the HDPE culvert. A reinforced concrete lintel of sufficient strength needs to be designed to span each of the three culvert penetrations, and the mislabeling of the pipe material needs to be corrected.

3. Information available from the wall block manufacturer indicates that guard rail posts are to be set in a grout-filled Sonotube with a minimum embedment of five feet. The plans propose direct-burial posts embedded only 41" into the ground. The plans need to be revised to meet or exceed the manufacturer's recommendations.

4. The wall section construction details on Sheet 2 show the base blocks having grooves in their bottom (these are middle blocks) instead of having a flat bottom (base blocks). The construction details must be revised to show base blocks.

5. On Sheet 1, the individual blocks weren't labeled on the two retaining wall elevations. Standard practice for wall systems such as the one proposed is to label the block type (e.g. 60B, 60M, 45M, 24T) of each block to avoid confusion during construction. For example, there are sections of the walls that require nine courses adjacent to sections that require ten courses, each of which requires different base blocks.

6. On Sheet 2, Note II.B, II.G and E.1 refer to geogrid. However, geogrid is not proposed elsewhere on the plans; the design is for a gravity wall instead. The references to geogrid are confusing and should be deleted.

7. The retaining wall is available in various textures. The plans do not propose a texture; we recommend that the design engineer coordinate a texture with the Planning Board.

8. GEI did not perform a structural engineering peer review of the proposed replacement wall. Such a review is beyond the scope of this general civil engineering peer review.

We trust this letter addresses your review requirements. Feel free to contact this office if you have any questions or comments.

Very truly yours,
Graves Engineering, Inc.

Jeffrey M. Walsh, P.E.
Vice President

cc: Norman Hill, P.E., P.L.S.; Land Planning, Inc.